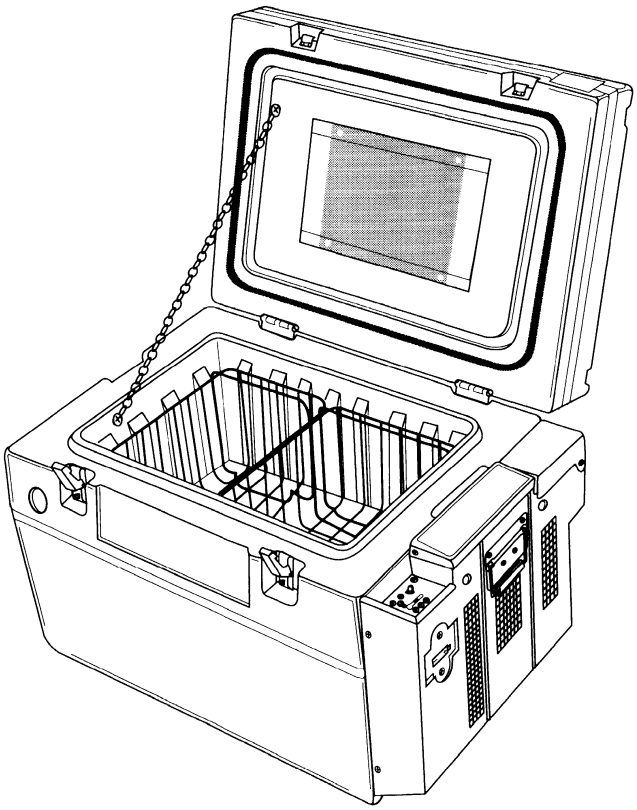
THERMOSTABILIZER



RCB 42 P
MRT 42 P

MAINTENANCE AND REPAIR MANUAL
MANUEL D'ENTRETIEN ET DE RÉPARATION
REPARATUR- UND WARTUNGSANLEITUNG

820 9502 90 - 250 KTL0696

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1 General Description

The THERMOSTABILIZER RCB42P is a refrigerating unit which is suitable for storing and transporting pre-cooled blood products and medicinal products, such as vaccines etc..

Up to 30 bags of blood, each containing 500 ml, can be stored and transported in the cool box.

A thermoelectric unit (Peltier block) together with an electronic control unit keeps the temperature in the cool box constant.

The thermoelectric unit is switched automatically from cooling to heating, depending on the ambient temperature.

The cool box can be operated with either direct current (DC battery voltage) of 11 V to 42 V or alternating current (AC supply voltage) of 90 V to 264 V, frequency 48 Hz to 62 Hz.

The insulation allows the temperature in the cool box to be kept constant for up to 8 hours when transporting or storing items without power supply at an ambient temperature of 25°C (77°F).

2 The Thermoelectric Unit

The core of the thermoelectric unit is composed of two elements which operate according to the Peltier effect.

This effect is based on the connection of two different semiconductors. If direct current flows through the junction of these two conductors, heat or cold, depending on the direction of the current, is generated at this junction. By reversing the direction of the current (pole reversal), it is possible to switch from heating to cooling or vice versa.

An electronic control unit measures the temperature in the cool box and controls the polarity and operating factor of the appliance. In this way the inside temperature of the appliance is kept constant between two set limits.

3 Safety Instructions

Please read this manual carefully before using the THERMOSTABILIZER. It contains important instructions for the operational safety, use, maintenance and repair of the appliance. Keep the manual in a safe place for future reference and make sure that it is retained with the appliance when the appliance is transferred to a new location for owner, so that information about operation and safety regulations is available for every user.

Every user must be well acquainted with the operation of the appliance and with the instructions concerning safety. Failure to observe these instructions can impair the performance of the appliance and cause damage.

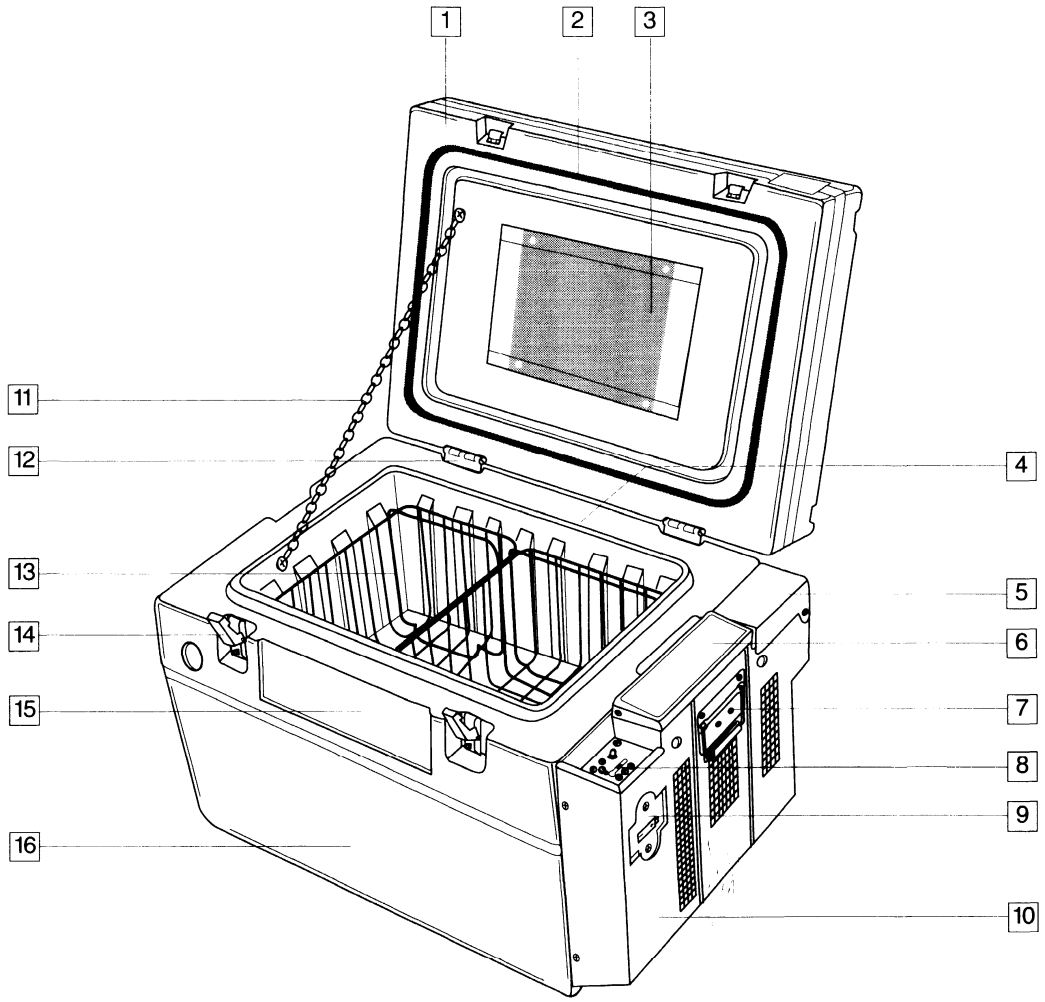
- The appliance may only be used by adults. Do not allow children to play with it or to tamper with the controls.
- Do not use a damaged appliance. Any damage must be repaired before putting into operation.
- Connection to the mains and installation are to be carried out in accordance with the operating instructions. Electrical connections must be compatible with the data on the type plate.
- The electrical safety of the appliance can only be guaranteed if the power supply earthing system has been installed in accordance with the regulations.
- When disconnecting the electrical supply, eg plug - socket, always take hold of the plug - not the connecting cable - to disconnect.
- If there is a malfunction, or before servicing or cleaning the appliance, switch off and disconnect from the mains. Pull out the mains plug or, if this is inaccessible, disconnect the fuse.
- Repairs to the appliance are only to be carried out by qualified persons.
- Do not cover or block the appliance's vents. Make sure that air can flow freely through the vents.

- Make sure that no objects or liquids enter the appliance through the vents.
- Do not constrict or damage the connecting cable when installing or moving the appliance.
- Have the appliance serviced once a year by a service engineer.
- Remove the lid before disposing of the appliance, to prevent children from becoming trapped inside.

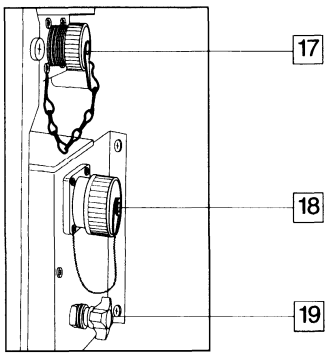
4 TECHNICAL DATA

Dimensions :	Length : Width : Height :	840 mm 550 mm 500 mm
Gross volume :	43 litres	
Storage and transport capacity :	30 whole blood bags, each containing 500 ml 50 packs of red blood corpuscles, each containing 270 ml	
Weight:	empty : loaded : (with 30 whole blood bags, each containing 500 ml)	29 kg 44 kg
Energy supply of box :	AC supply voltage : frequency: DC battery voltage :	90 V to 264 V 48 Hz to 62 Hz 11 V to 42 V
Connected load :	AC supply voltage : DC battery voltage :	130 W 120 W
Energy consumption over 24 hours :	1.92 kW/h at an ambient temperature of 25°C (77°F) (mains and battery operation)	
Energy supply of alarm system :	4 nickel cadmium storage batteries Type AA (Mignon 1,2V/R6) 500 to 750 mAh operating time without mains connection ≤ 24 hours charging time during operation: 48 hours charging time in battery charger: 14 hours at 50 mA	
Safety category :	splash-proof protection in accordance with IP 54	
Interference suppression :	EMC in accordance with MIL standard 461-462 704D and EC directive 89/336 EEC	
Low-voltage :	in accordance with EC directives 73/23/EEC and 93/68/EEC	
Ambient conditions :	temperature range: -32°C (-25°F) to +44°C (111°F) protect box from heavy rain, sand and snow	

5 General View



1 Lid
2 Sealing
3 Document pocket
4 Type plate (rear of appliance)
5 Temperature recorder compartment (optional)
6 Storage compartment
7 Handle
8 Operating panel
9 Battery compartment
10 Cover
11 Chain
12 Hinge
13 Basket
14 Spring lock
15 Label surface
16 Container
17 Connection for temperature recorder
18 Connection for AC/DC power supply
19 Equipotential bonding connection



6 UNPACKING

After unpacking the appliance, first make sure it has not been damaged in transit.

If any damage has been incurred, please inform the responsible supplier immediately and submit the delivery note or proof of purchase.

UNDER NO CIRCUMSTANCES MAY A DAMAGED APPLIANCE BE PUT INTO OPERATION.

Most of the packaging can be recycled and should therefore be taken to the area recycling centre. Please remember that, with regard to environmental protection, the remaining materials should be disposed of in a proper and orderly manner.

7 CLEANING

Before putting into operation, the interior and exterior should always be cleaned :

- Add some mild detergent to lukewarm water
- Clean the interior and exterior of the appliance with a damp cloth.
- Dry the cleaned parts thoroughly; never use any kind of heater for this purpose.

NEVER USE ACIDIC OR CAUSTIC DETERGENTS, SCOURING POWDER, STEEL WOOL, ABRASIVE SPONGES, CHEMICAL SOLVENTS OR POLISHES TO CLEAN THE APPLIANCE.

Once the appliance has been put into operation, clean the container, lid and storage baskets regularly.

Remove any dust and dirt from the covers inside and outside the appliance, and from underneath the covers several times a year with a brush or a vacuum cleaner.

8 INSTALLATION

In order to ensure perfect operation, please observe the following :

- Install the appliance in a dry, well ventilated room.
- Make sure the appliance is positioned firmly and securely.
- There should be a distance of approximately 10 cm from any walls or adjacent appliances.
- Do not expose the appliance to direct sunlight or operate it in the immediate vicinity of other sources of heat.
- Make sure that air can circulate freely through the vents and that these remain unobstructed at all times.
- No objects or liquids should be allowed to enter the appliance through the vents.

The THERMOSTABILIZER is splash-proof. When using outdoors however, the appliance should be protected against sand, snow and heavy rain.

9 ENERGY SUPPLY

The appliance can be operated with either direct or alternating current.
The following voltage ranges are covered by the energy supply unit :

AC operation :	voltage :	90 V - 264 V
	frequency :	48 Hz - 62 Hz
DC operation :	voltage :	11 V - 42 V

10 CONNECTING UP

Two 2-meter-long connecting cables, one for mains and one for battery connection, are supplied with each appliance. These cables have to be fitted with plugs which conform to the local regulations.
The wires of the mains lead are coloured in accordance with the following code :

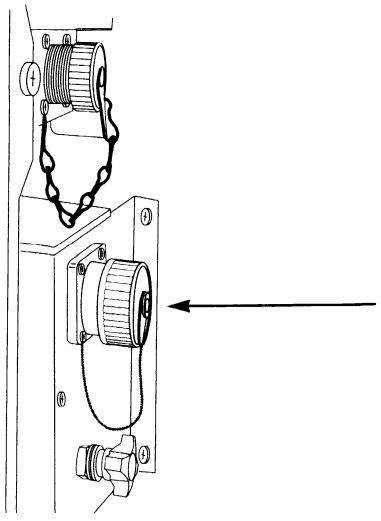
Green / Yellow : Earth
Blue : Neutral
Brown : Live

Warning : The appliance must be earthed !

The wires of the battery connection cable are marked with „+" and „-" symbols.

Always connect up the appliance to a separately fused circuit, in order to prevent breakdown caused by problems with other electrical appliances.

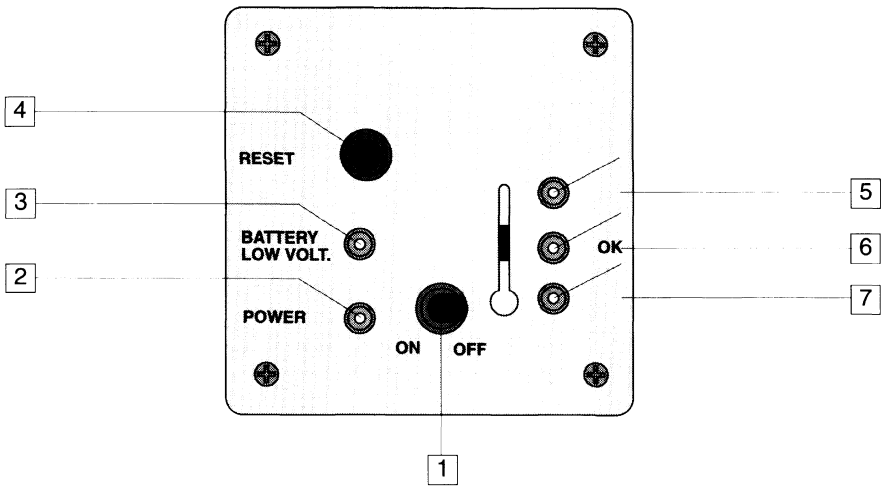
THE CONNECTION OF THE PLUGS AS WELL AS ANY MODIFICATIONS TO THE CONNECTING CABLES MAY ONLY BE MADE BY A OUALIFIED ELECTRICIAN.



Connection for AC/DC power supply

- Select the cable appropriate for the power supply you wish to use.
- Remove the cover cap from the appliance inlet by turning anticlockwise.
- Connect the selected connecting cable outlett to the appliance inlet and turn the bayonet lock clockwise until it locks into place.
- Plug the cable into the power supply you wish to use (battery or mains).

11 Operating Panel



1	On/Off switch	
2	LED green	power control lamp
3	LED red	battery voltage too low
4	Reset button for alarm	

Temperature control lamps :

5	LED red	inside temperature too high
6	LED green	inside temperature OK
7	LED red	inside temperature too low

12 Operation

Switching on :

- Flip the switch 1 to „ON".
- The power control lamp 2 lights up.

Depending on the temperature inside the cool box, LED 5 , 6 or 7 lights up or flashes:

Temperature control lamp	Inside temperature	
5 flashes	too high	After a period of time the temperature inside the cool box reaches the value set of 2-8°C (35-46°F) by means of the cooling operation.
6 lights up	ok (2-8°C / 35-46°F)	The cool box can be filled with precooled bags of blood or vaccines.
7 flashes	too low	After a period of time the temperature inside the cool box reaches the value set of 2-8°C (35-46°F) by means of the heating operation.

When the appliance is switched on for the first time, the acoustic alarm is locked.

If the lid of the appliance is left open for some time during operation, the temperature probe may record, due to the warm flow of air, a temperature which is outside the given limits and the alarm will be triggered off.

- Close the lid immediately.
- Press the reset button [4] . The acoustic alarm stops and the LED continues to flash.

The preset temperature is regained when the control lamp [6] lights up. The flashing LED [5] or [7] can now be reset by pressing the reset button [4] .

SWITCHING OFF :

- Flip the switch [1] to „OFF".

The control lamp [2] goes out and the temperature control lamps are no longer lighted. The alarm system is switched off.

If switch [1] is left in the „ON" position and the connecting cable removed from the socket, the alarm system remains activated for approximately 24 hours, until the internal batteries have run down.

13 ALARM SYSTEM POWER SUPPLY

Four rechargeable nickel cadmium batteries supply the alarm system with power for approximately 24 hours in the event of power failure. The batteries are continuously recharged by the electronic equipment during normal operation.

ONLY USE RECHARGEABLE NICKEL CADMIUM BATTERIES :
AA (Mignon 1,2V / R6) 500 to 750 mAh.

14 TROUBLESHOOTING

malfunctions

possible causes	AC - mains operation - no power	DC - battery operation - no power	Continual heating up of interior	Continual cooling down of interior	Poor refrigerating capacity	Visual and acustic alarm with high frequency	No visual or acoustic alarm	LED „POWER" flashes - acoustic alarm	LED „BATTERY LOW VOLT." flashes - acoustic alarm	LED „temperature too high" flashes - acoustic alarm	LED „temperature too low" flashes - acoustic alarm	remedy
No mains voltage	●							●				Check mains voltage supply
No battery voltage		●						●				Check battery voltage supply
Defective plug	●	●						●				Check plug
battery voltage ≤ 9 V, or ≥ 44 V		●						●				Check battery voltage
mains voltage ≤ 85 V, or ≥ 270 V	●							●				Check mains voltage
Storage battery voltage < 4,4 V									●			Check mains/battery voltage Check batteries
Storage batteries run down						●						Recharge storage batteries
Defective storage batteries						●						Replace storage batteries
Defective EMC filter	●	●										Replace combination circuit unit
Defective combination circuit unit	●	●						●				Replace combination circuit unit
Defective electronic control board RP200	●	●	●	●	●		●					Replace control board
Defective contact of connection strip X101	●	●						●			●	Check connection
Defective contact storage battery - control unit								●		●	●	Check connection
Defective contact of connection strip X102							●					Check connection
Short circuit in temperature control NTC detector				●						●		Replace thermoelectric unit
No contact NTC detector - temperature control			●								●	Replace thermoelectric unit
Defective thermoelectric unit					●							Replace thermoelectric unit
Defective inner ventilator					●							Replace ventilator
Defective outer ventilator					●							Replace ventilator
Dusty thermoelectric unit					●							Clean thermoelectric unit

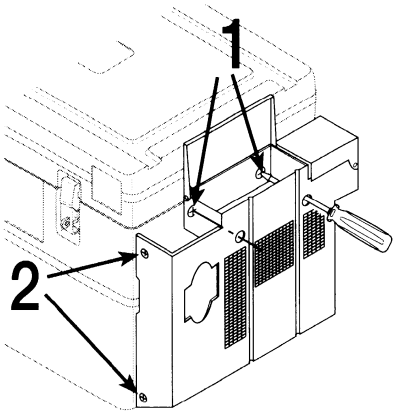
15 MAINTENANCE

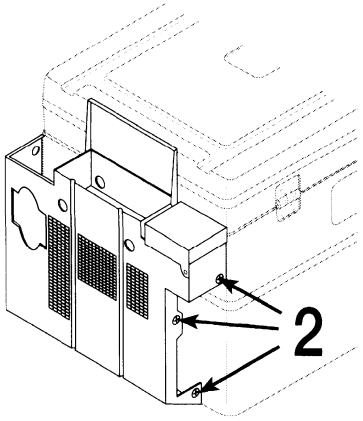
- Regularly check all screws on hinges, seals and locks, handles, chain, operating panel, battery compartment, Peltier block and appliance cover. Tighten, if necessary.
- Clean the battery terminals in the holder.
- Check the storage batteries. If they are warped or oxidized, replace the batteries together with the holder.

AS A PREVENTIVE MEASURE, THE STORAGE BATTERIES SHOULD BE REPLACED EVERY 5 YEARS

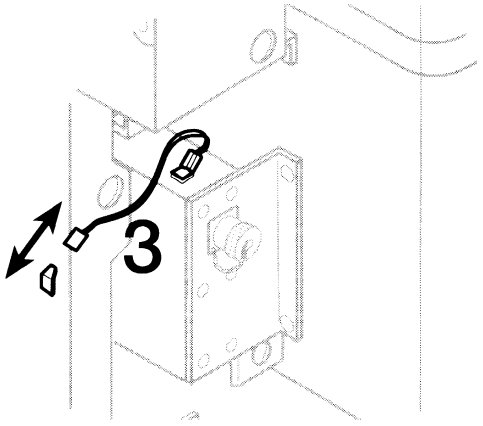
16 DISMANTLING THE COVER

- Unscrew the two screws (1) by inserting the screwdriver, as shown, through the holes in the storage compartment.





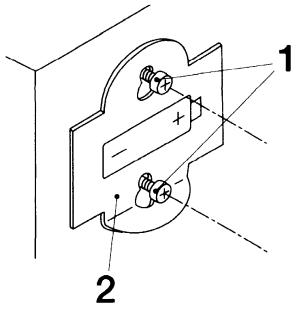
- Unscrew the remaining fastening screws (2) on the cover.



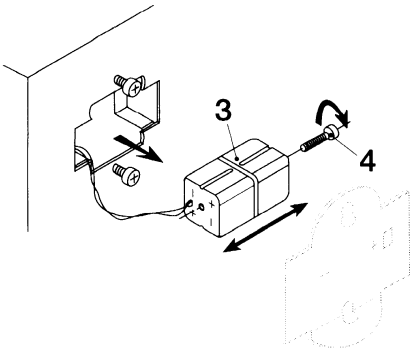
- Pull the green/yellow earth wire (3) from the contact plug on the cover and remove the cover.

Reassembly of the cover is in reverse order.

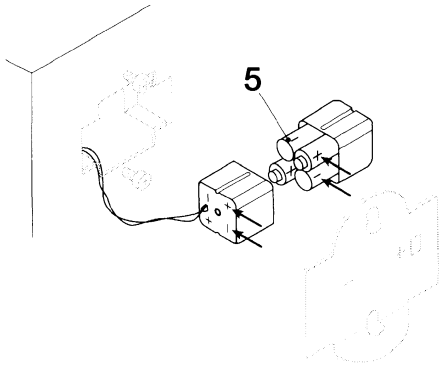
17 Changing the Storage Batteries



- Unscrew the two screws (1) on the cover
- Push the cover (2) upwards a little.
- Remove the cover (2).



- Take out the storage battery casing (3).
- Remove the screw (4).
- Pull the two halves of the casing apart and remove the old batteries.

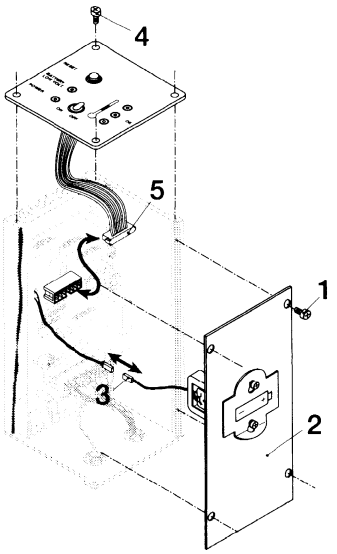


- Insert four new batteries (5) into the casing, making sure that the polarity is correct.

INCORRECT CONNECTION OF TERMINALS CAN CAUSE DAMAGE TO THE CONTROL BOARD !

- Reassembly is in reverse order.

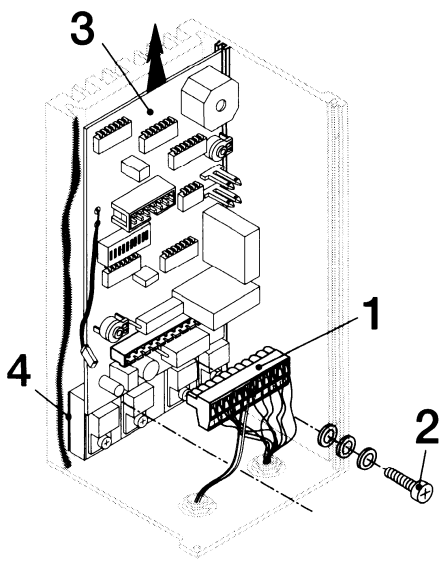
18 Replacing the Operating Panel



- Remove the cover (chapter 16).
- Remove the four screws (1) on the cover plate.
- Disconnect the battery cable plug connection (3) before removing the cover plate (2).
- Remove the four screws (4) on the operating panel.
- Disconnect the plug (5) from the connection strip X102 on the control board.

Installation of a new operating panel is in reverse order.

19 Replacing the Control Board RP200

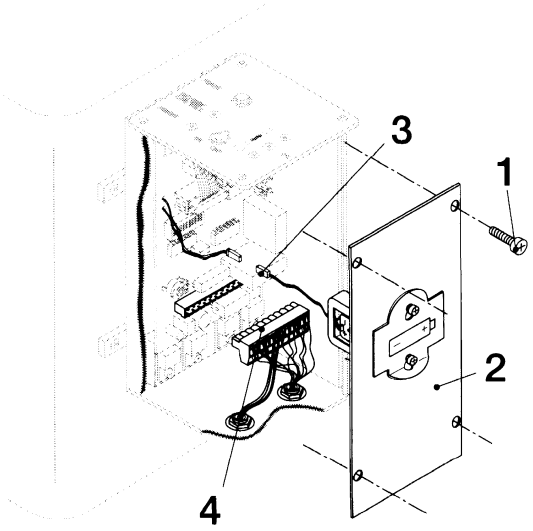


- Remove the cover (chapter 16).
- Remove the cover plate and operating panel (chapter 18).
- Pull the 12-channel plug (1) out of the connection strip X101 on the control board.
- Remove the two screws (2) in the board.
- Slide the control board (3) upwards to remove

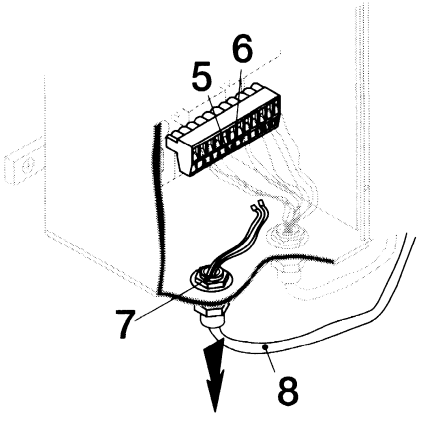
Installation of a new control board is in reverse order. Please note the following :

- To ensure good heat dissipation, heat conducting paste (4) must be applied thinly to the back of the board at the bottom.
- Great care must be taken when replacing the screws (2), in order to avoid damaging the new board.

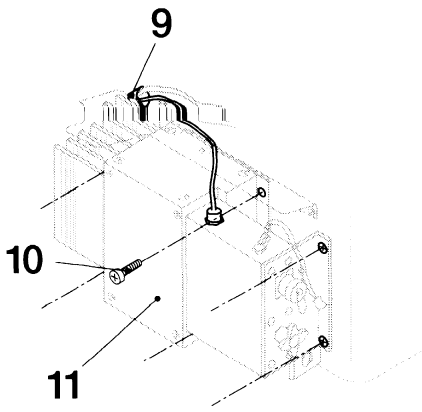
20 Replacing the Combination Circuit Unit



- Remove the cover (chapter 16).
- Remove the four screws (1) in the cover plate. (2).
- Disconnect the battery cable plug connection (3) before removing the cover plate.
- Pull the 12-channel plug (4) out of the connection strip X101 on the control board



- Remove wires (5) and (6) from the 12-channel plug (4).
- Unscrew the union nut (7).
- Remove the cable (8), together with the screw fitting, from the casing.

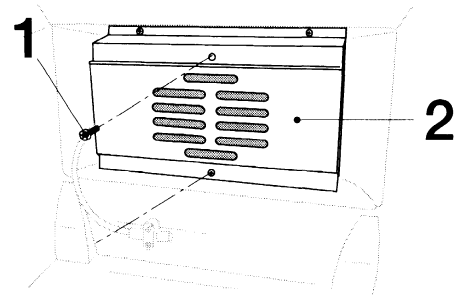


- Remove the cable clip (9).
- Unscrew the six screws (10) and remove the combination circuit unit (11).

Installation of a new combination circuit unit is in reverse order.

When connecting up wires (5) and (6), make sure the wiring is correct (same figures for wires and 12-channel plug)

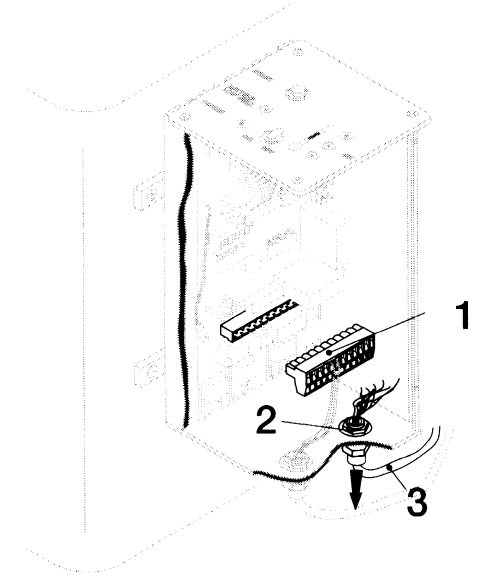
21 Replacing the Ventilator Cover



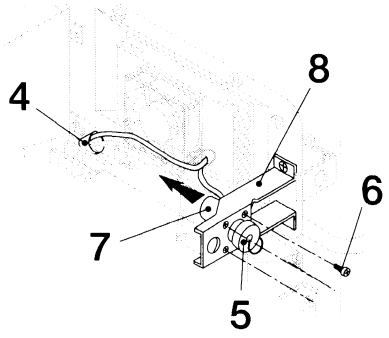
- Open the box and remove the two baskets.
- Unscrew the two screws (1) and remove the ventilator cover (2).

Installation of a new cover is in reverse order.

22 Replacing the Peltier Block

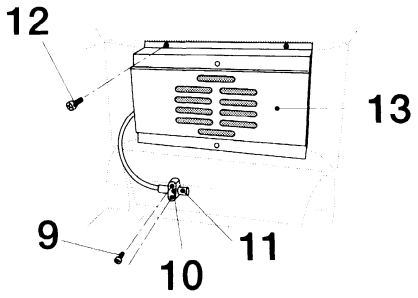


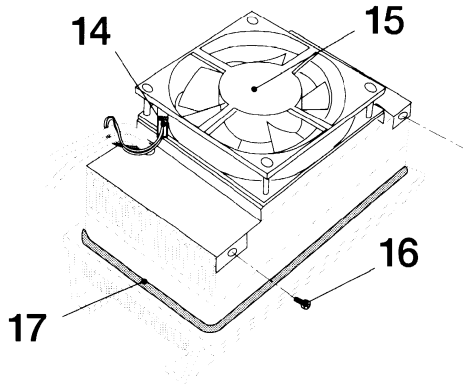
- Remove the cover (chapter 16).
- Remove the cover plate from the electronic equipment casing and disconnect the battery cable plug connection (chapter 18).
- Pull the 12-channel plug (1) out of the connection strip X101 on the control board.
- Remove wires 1 to 4 and 7 to 12 from the 12-channel plug (1).
- Unscrew the union nut (2).
- Remove the cable (3), together with the screw fitting, from the casing.



- Remove the cable clip (4).
- Remove the cover cap (5) on the socket.
- Unscrew the four socket screws (6).
- Pull the socket (7) out of the angle bracket (8).

- Open the box and remove the two baskets.
- Unscrew the two screws (9) and remove the detector's (11) anchoring clip (10).
- Unscrew the four screws (12) on the Peltier block (13) and remove this by pulling inwards.



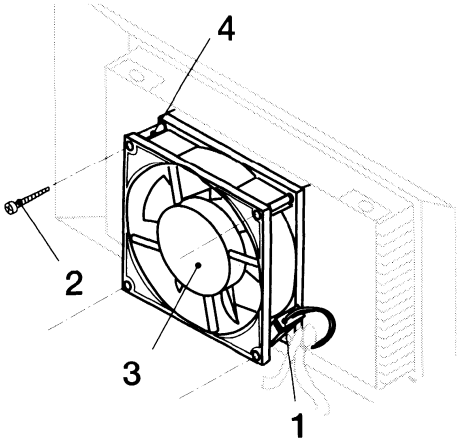


- Remove the ventilator cover (chapter 21).
- Disconnect the plug (14) from the connector shell on the ventilator (15).
- Unscrew the four screws (16) and remove the ventilator (15) together with the mounting plates.

Installation of a new Peltier block is in reverse order, whereby it is important that the wires are connected up correctly to the 12-channel plug (same figures for wires and plug).

Before assembling the Peltier block, make sure the sealing (17) is fitted correctly.

23 Replacing the Outer Ventilator



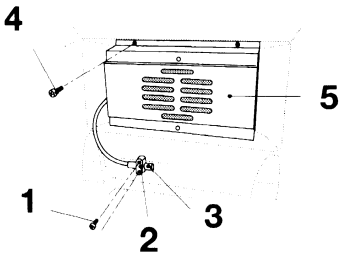
- Remove the cover (chapter 16).
- Disconnect the plug (1) from the connector shell on the ventilator.
- Unscrew the four screws (2) and remove the ventilator (3).
- Remove the four spacers (4) from the ventilator.

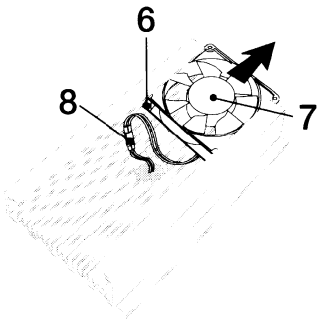
Installation of a new ventilator is in reverse order.

When connecting up the plug, make sure the terminals are connected correctly („+“ on the plug to „+“ on the connector shell).

24 Replacing the Inner Ventilator

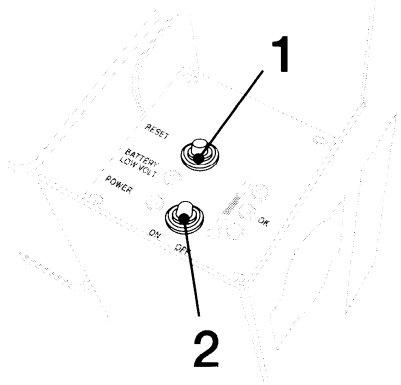
- Remove the ventilator cover (chapter 21).
- Unscrew the two screws (1) and remove the detector's (3) anchoring clip (2).
- Unscrew the four screws (4) on the Peltier block (5) and move the block as far as possible to the inside of the box.





- Unscrew the two screws (6) and slide the ventilator (7) sideways until the plug connection (8) is visible.
- Disconnect the plug connection (8).
- Slide the ventilator (7) out of the Peltier block profile.
- Installation of a new ventilator is in reverse order.

25 Replacing the Cover Tap for Switch/Reset Button

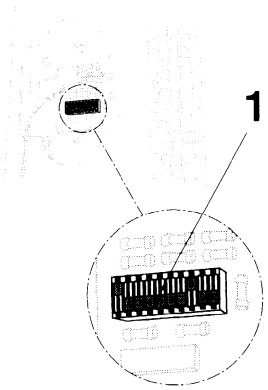


To replace the cover caps on the switch and reset button, proceed as follows:

- Remove the cover cap on the reset button (1) or switch (2) by unscrewing with a small pipe wrench. Position the wrench on the knurled nut.
- Screw the new cover cap onto the switch or reset button in the same way.

Please note that the two cover caps are different.

26 Setting the Temperature Limits



- Remove the storage battery casing (chapter 17).
- Check the switch positions 1-10 on the switch S101 (1) and, by means of the table below, determine the set temperature limits.
- If necessary, adjust the switch positions.
- Reinstall the storage battery casing

Note :

Switch S101 is for selecting the minimum and maximum temperature limits, from which the set point is determined (arithmetic average of the two limits)

The minimum temperature limit is set with switches 1 - 5. The maximum temperature limit is set with switches 6 -10. A temperature limit is set when the switch in question is in the up position (ON). Make sure that only one switch in each group is in the ON position.

	switch									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Minimum in °C	1	3	6	7	9					
Minimum in °F	33.8	37.4	42.8	44.6	48.2					
Maximum in °C						3	6	7	9	10
Maximum in °F						37.4	42.8	44.6	48.2	50

The maximum temperature must always be set at least 2°(3.6°F) higher than the minimum temperature.
The limits marked in the table of +1°C (+33.8°F) and +7°C (+44.6°F) (switches 1 and 8) are preset at the factory. This setting results in a set point temperature of +4°C (+39.2°F).

IF THE FACTORY SETTINGS FOR SWITCH S101 HAVE TO BE ALTERED, CHECK TO MAKE SURE THAT THE SET TEMPERATURES ARE REACHED IN THE APPLIANCE.

27 CIRCUIT DIAGRAM